



UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/253,306	02/19/99	GARDNER	D 042390.F5832

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MMC2/1012

EXAMINER

TRAN, T

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 10/12/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/253,306	Applicant(s) GARDNER ET AL.	
	Examiner Thien F Tran	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-6,9-11,14-16 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 4-6,9-11,14-16 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 4-6, 9-11, 14-16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al. (US 5,635,763) in view of Lowrey et al. (US 4,999,160).

Inoue et al. discloses a semiconductor device comprising a multilayered interconnection structure (Figs. 3A-3B) formed on a substrate 1, the interconnection comprises a second titanium nitride layer 9 overlying a second titanium layer 21, an aluminum alloy layer 10 overlying the second titanium nitride layer 9, a first titanium layer 23 overlying the aluminum alloy layer 10, and a first titanium-nitride layer 11 overlying the first titanium layer 23. Inoue et al. does not explicitly disclose the layer 10 being an aluminum-copper-titanium alloy layer containing 0.5 atomic % copper (same as about 1.2 weight % copper) and 0.1 atomic % titanium (same as about 0.18 weight % titanium). Lowrey et al. discloses an aluminum-copper-titanium alloy layer for interconnection containing 0.5 - 3 weight % copper and 0.05 - 1 weight % titanium. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to

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incorporate the aluminum alloy layer of Lowrey et al. into Inoue et al. in order to resist electromigration and stress cracking.

Response to Arguments

3. Applicant's arguments filed on 08-15-00 have been fully considered but they are not persuasive.

Lowrey et al. clearly teaches an aluminum copper titanium alloy that also contains silicon, wherein the alloy contains about 0.1 atomic percent titanium. Having silicon or not having silicon in the alloy is irrelevant because the rejected claims do not exclude silicon from the alloy or claim the alloy contains only the three elements, aluminum, copper and titanium. The term "alloy" is a broad term that means more than two metals are included in the compound. Especially, when the term "comprising" is used in the claims, "comprising" is open-ended that allows other elements to be included also. For example, Lee et al. (US 5,641,992, col. 6, lines 46-47) claims an aluminum-copper alloy layer comprises 95.5% Al and 0.5% Cu. However, claiming an aluminum copper alloy does not mean that the alloy contains only aluminum and copper. That is a wrong assumption because aluminum and copper of Lee et al. only account for 96 % of the alloy which clearly indicates that there are other elements (not mentioned) in the alloy that take up the remaining 4% of the alloy. As a result, unless the silicon is expressly excluded from the alloy in the claim, the alloy layer taught by the prior art is not patentable distinguished over the alloy layer as claimed since an alloy layer also contains other elements not mentioned since they are

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unimportant or very small to make any difference or change in the function or property of the alloy layer.

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Thien Tran** whose telephone number is (703) 308-4108. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Tom Thomas**, can be reached on (703) 308-2772. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


Sara Crane
Primary Examiner

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October 9, 2001